

416. On experimenting with sulphuric acid, I found no reason to believe that it was by itself a conductor of, or decomposable by, electricity, although I had previously been of that opinion (288). When very strong it is a much worse conductor than if diluted.<sup>1</sup> If then subjected to the action of a powerful battery, oxygen appears at the *anode*, or positive electrode, although much is absorbed (463), and hydrogen and sulphur appear at the *cathode*, or negative electrode. Now the hydrogen has with me always been pure, not sulphuretted, and has been deficient in proportion to the sulphur present, so that it is evident that when decomposition occurred water must have been decomposed. I endeavoured to make the experiment with anhydrous sulphuric acid; and it appeared to me that, when fused, such acid was not a conductor, nor decomposed; but I had not enough of the dry acid in my possession to allow me to decide the point satisfactorily. My belief is, that when sulphur appears during the action of the pile on sulphuric acid, it is the result of a secondary action, and that the acid itself is not electrolysable

(49<sup>2</sup>)\*

417. Phosphoric acid is, I believe, also in the same condition; but I have found it impossible to decide the point, because of the difficulty of operating on fused anhydrous phosphoric acid. Phosphoric acid which has once obtained water cannot be deprived of it by heat alone. When heated, the hydrated acid volatilises. Upon subjecting phosphoric acid, fused upon the ring end of a wire (137), to the action of the voltaic apparatus, it conducted, and was decomposed; but gas, which I believe to be hydrogen, was always evolved at the negative electrode, and the wire was not affected as would have happened had phosphorus been separated. Gas was also evolved at the positive electrode. From all the facts, I conclude it was the water and not the acid which was decomposed.

418. *Arsenic acid*. This substance conducted, and was decomposed; but it contained water, and I was unable at the time to press the investigation so as to ascertain whether a fusible anhydrous arsenic acid could be obtained. It forms, therefore, at present no exception to the general result.

419. Nitrous acid, obtained by distilling nitrate of lead, and

keeping it in contact with strong sulphuric acid,  
was found to  
conduct and decompose slowly. But on  
examination there were  
strong reasons for believing that water was  
present, and that  
the decomposition and conduction depended  
upon it. I en\*

<sup>1</sup> De la Rive.